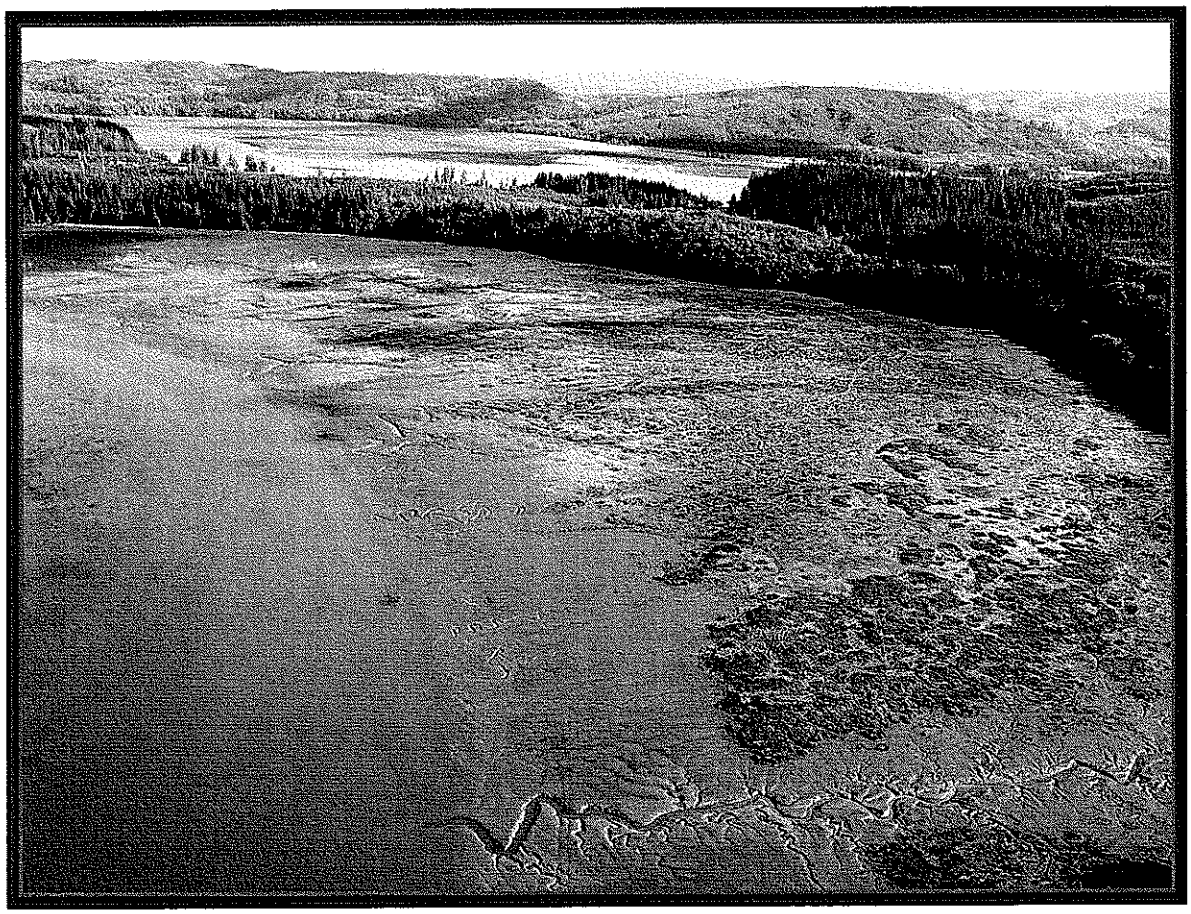
2005 *Spartina* Eradication Program
Water Quality Monitoring



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Washington State Department of Agriculture

Introduction

Water quality monitoring was conducted in Willapa Bay, and Puget Sound, to detect the presence of glyphosate (Aquamaster™, Rodeo™, or Aquaneat™) and imazapyr (Habitat™) adjacent to locations where *Spartina* control activities were conducted. The monitoring activities, conducted by Washington State Department of Agriculture (WSDA), met the third year monitoring requirement of the Aquatic Noxious Weed Control National Pollution Discharge Elimination System Waste Discharge General Permit, WAG 993-000 (NPDES) *Spartina* section.

The purpose of monitoring was to record glyphosate and imazapyr concentrations in the effected water bodies subsequent to the treatments by different herbicide application modalities utilized for control of certain infestation types. The application/infestation matrices are shown in Table 1. Samples were collected to look at concentrations at the treatment site directly after applications, through time over several days after the applications, and off-site directly after the application.

Table 1. Applications used for differing infestation types

Sample Location	Application Type	Herbicide	Infestation Type	Sample Type
Tarlatt Slough, Willapa Bay	Aerial	Imazapyr	Meadow	Concentration/ Concentration though time
South Skagit Bay, Snohomish County	Aerial	Glyphosate/ Imazapyr	Meadow	Concentration/ Concentration through time
Rose Ranch, Willapa Bay	Hand Held	Glyphosate/ Imazapyr	Scattered Clones	Concentration through time
South Nahcotta, Willapa Bay	Precision Broadcast	Glyphosate/ Imazapyr	Meadow	Concentration through time
Elger Bay, Island County	Precision Broadcast	Glyphosate/ Imazapyr	Meadow	Off-site transport

Pre-treatment samples were also collected at various sites in each water body at least 12 hours before any treatments were conducted to the sampled water body. Pre-treatment sampling was conducted to identify if any water bodies had pre-existing levels of glyphosate or imazapyr in the water column. All of these samples were returned negative for the presence of glyphosate and imazapyr.

Pre-treatment sampling was conducted at sites that were likely to be used as post treatment sampling sites or at nearby locations in each water body prior to any applications.

Treatments

Spartina treatments occurred between June 1 and October 30, 2005. All treatments were conducted by applicators licensed by WSDA using any of the application types listed in Table 1. Private landowners, United States Fish and Wildlife Service, WA State Department of Fish and Wildlife, WA Department of Natural Resources, WSDA, and county personnel, from Island, Skagit, and Snohomish Counties, conducted applications. All applications were made following the appropriate federal and state approved product labels.

A total of over 5,000 acres were treated with glyphosate and imazapyr employing an integrated approach during the entire 2005 treatment season. The entities conducting control made mixed use of integrated vegetation management (IVM) strategies; including chemical, mechanical, manual, and biological control approaches. All entities followed the guidelines identified in the Statewide *Spartina* IPM Plan.

Sites

All concentration and concentration through time post treatment sampling sites were located at the shoreward edge of the treatment area, and samples were collected as the tide was flowing in over the treatment area. All off-site transport post treatment sampling sites were located at areas were the outgoing tide would move the material towards. Samples were taken during the first outgoing tide, after the treatment site had been inundated.

Concentration through time sampling was conducted at Tarlatt Slough, Rose Ranch, South Skagit Bay, and South Nahcotta. All concentration through time sampling was done approximately 24 hours after the final treatment to the site was completed.

Sample Handling

All samples were collected no sooner than the subsequent high tide after the completion of treatment to the entire site. Water depth at sampling stations ranged from 6 inches to approximately 5 feet. Samples were sent to an accredited lab on ice, via overnight courier. The samples were occasionally stored overnight in a cooler inside a refrigerator before being shipped the next morning. This delay was incurred because the variable timing of sampling did not allow for immediate shipping. A Washington State Department of Ecology accredited laboratory using the method, EPA 547 for glyphosate analysis and an HPLC analysis method for imazapyr, analyzed all samples.

Efficacy

Some efficacy surveys were conducted during the treatment season. These mainly focused on the amount of "brown down" and new shoot development exhibited in the areas receiving trial treatments. The nature of the reaction of *Spartina* to glyphosate and imazapyr treatments makes complete, same-season surveys nearly futile. The plants turn brown to the ground, but the bulk of the roots may be unaffected. This sizeable amount of root mass beneath the surface may send up shoots the next growing season that were imperceptible the prior season.

Summary of Imazapyr Presence

Sampling for imazapyr was done to look for presence of the herbicide directly after application at the treatment site (concentration), directly after application away from the treatment site (off-site transport) and at the treatment site 24 and 48 hours after application (concentration through time). All the samples that were analyzed and found to have presence of herbicide were at acceptable levels, however the Tarlatt Slough site produced an unusually high presence of imazapyr from concentration sampling and, to a lesser extent, from concentration through time sampling. This site shares some geographical similarities to the Rose Ranch site (farm dike, tide gate) that produced anomalous results in 2003 and 2004 for the presence of glyphosate. The Tarlatt Slough site will be monitored again in 2006 and pre-treatment samples will be taken at the exact location of 2005 samples. The 2006 samples will be taken away from the water flowing through the tide gate from the upland farm fields.

The concentration through time sample collected at 24 hours post treatment that showed herbicide presence had shown a decreased reading from the sample collected directly after the application.

Treatment Site: Tarlatt Slough (approximately 300 acres treated)

Sample 1 - concentration	Sample 2 – concentration through time
231 ppm	155 ppm

Treatment Site: South Skagit Bay (approximately200 acres treated)

Sample 1 - concentration	Sample 2 – concentration through time
0.545 ppm	0.124 ppm

Treatment Site: Rose Ranch (approximately 50 acres treated)

Sample 1 – concentration through time	Sample 2 – concentration through time
ND	0.052 ppm

Treatment Site: South Nahcotta (approximately 25 acres treated)

Sample 1 –off-site / through time	Sample 2 – off-site / through time
0.002 ppm	0.002 ppm

Treatment Site: Elger Bay (approximately 7 acres treated)

Sample 1 – off-site transport	Sample 2- off-site transport
0.009 ppm	0.007 ppm

Summary of Glyphosate Presence

Sampling for glyphosate was done to look for presence of the herbicide directly after application at the treatment site (concentration), directly after application away from the treatment site (off-site transport) and at the treatment site 24 and 48 hours after application (concentration through time). All samples collected were well below the 700 ppb drinking water standard. The Rose Ranch site, which produced anomalous results in 2003 and 2004 provided results comparable to other sites in 2005. The contrast in results at this site may be explained by the proximity of the sampling site to a farm dike and tide gate. Pre treatment sampling at this site yielded negative results for the presence of glyphosate. This site will be further sampled during the 2006 season, and pre-treatment samples will be collected at the exact location of the 2005 post treatment samples, as well as at the main channel leading from the farm dike and tide gate.

Treatment Site: Rose Ranch (approximately 50 acres treated)

Sample 1 – concentration through time	Sample 2 – concentration through time
ND	0.07 ppm

Treatment Site: South Skagit Bay (approximately 200 acres treated)

Sample 1 - concentration	Sample 2 – concentration through time
0.46 ppm	0.12 ppm

Treatment Site: South Nahcotta (approximately 25 acres treated)

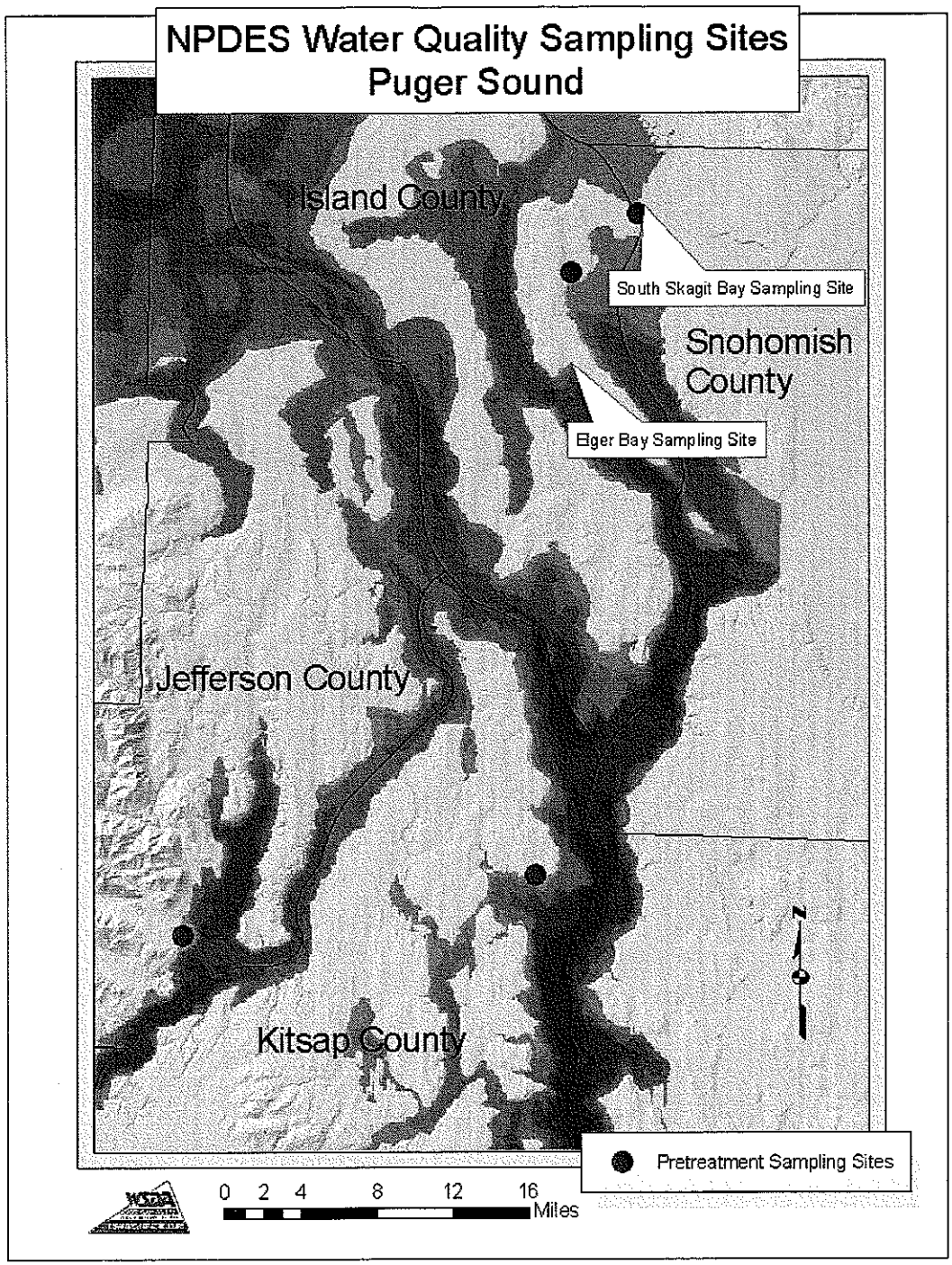
Sample 1 – off-site / through time	Sample 2 – off-site through time
ND	ND

Treatment Site: Elger Bay (approximately 7 acres treated)

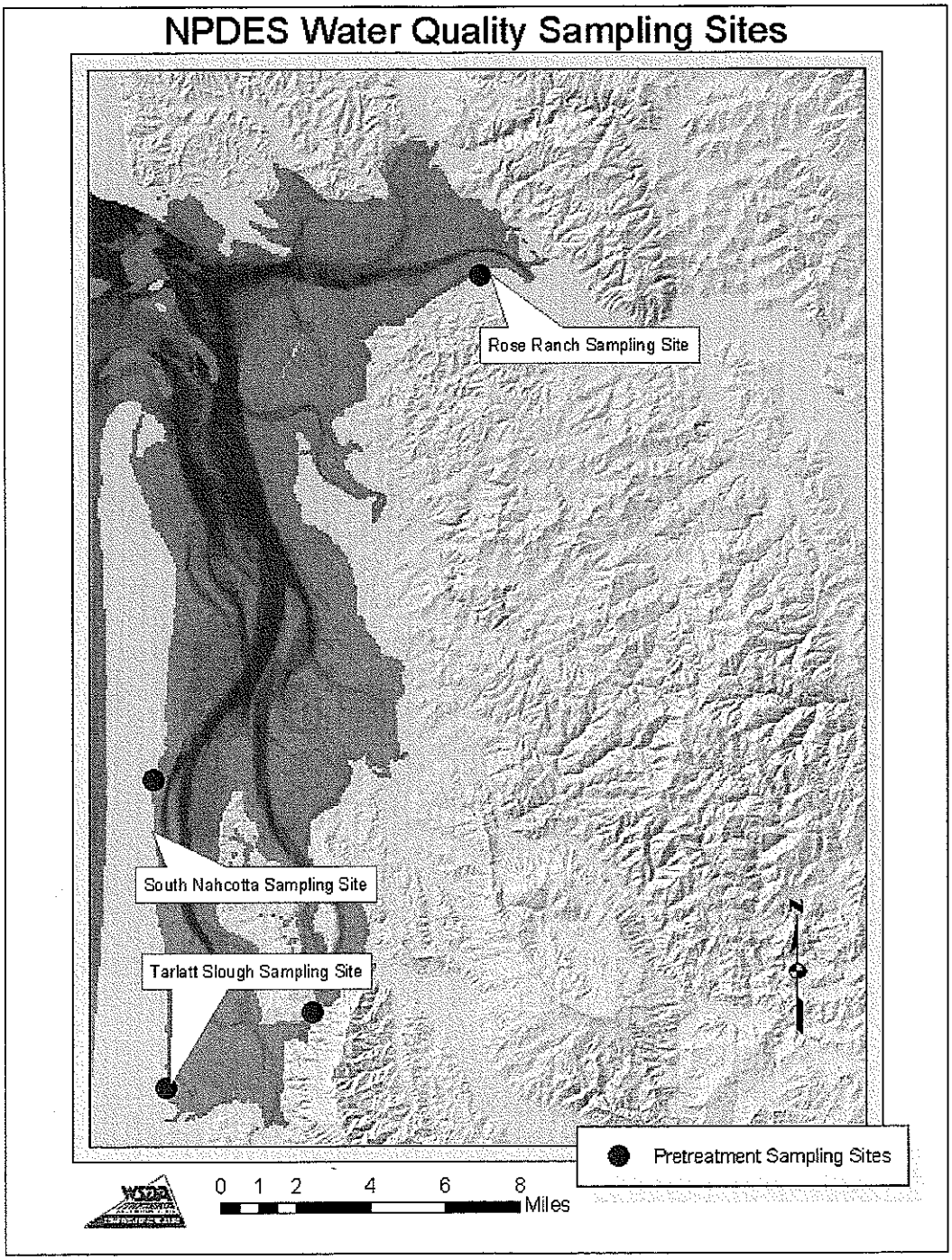
Sample 1 – off-site transport	Sample 2 – off-site transport
0.05 ppm	0.04 ppm

Sample Locations

Puget Sound



Willapa Bay


NPDES Water Quality Sampling Sites
Rose Ranch Sampling Site
South Nahcotta Sampling Site
Tarlatt Slough Sampling Site
Pretreatment Sampling Sites
0 1 2 4 6 8
Miles

Attachment A
Signatory Page

I certify under penalty of law, that this document and all attachments were prepared under my direction, or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiries of the person or persons who manage the system, or those persons directly responsible for gathering information, in information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

1 Feb 2006

Brad White, Pest Program Manager
Washington State Department of Agriculture